

Claims

1. A method for monitoring an optical transmission line by means of an optical amplifier, in particular a Raman amplifier,

(a) wherein the pump power (P_p) generated by a pump source (13) of the optical amplifier (7) is coupled into the optical transmission line (9),

(2) wherein the power (P_{ASE}) of the ASE (Amplified Spontaneous Emission) signal generated by the pump power (P_p) in the transmission line (9) and fed back toward the optical amplifier (7) is detected, and

(c) wherein an error signal is generated when the power (P_{ASE}) of the detected ASE signal falls below a preset threshold value.

2. The method as in Claim 1, characterized in that, in the event of an error signal, the pump source (13) is deactivated.

3. The method as in Claim 1 or 2, characterized in that, in the event of an error signal, an error message and/or an operator call is generated.

4. The method as in any one of the preceding claims, characterized in that the pump power (P_p) is increased continuously or gradually step by step, and that the ASE signal is detected continuously and/or gradually step by step and compared at each incremental step to a threshold value that corresponds to the relevant pump power (P_p).

5. The method as in Claim 4, characterized in that an error signal is generated if, for the values detected for several or for all different values of the pump power (P_p), the power (P_{ASE}) of the associated ASE signal drops below a relevant threshold value.

6. The method as in any one of the preceding claims, characterized in that, in an upstream process step, the pump power (P_p) is set to a value at which nonlinear optical effects do not yet

occur in the transmission line (9) and that, instead of the power (P_{ASE}) of the ASE signal, the power of a signal component potentially reflected in the transmission line (9) is detected and that a reflection error signal is generated when the power of a detected reflected error signal exceeds a preset threshold value.

7. The method as in any one of the preceding claims, characterized in that, in the phase of starting up the optical amplifier (7), the pump power (P_p) is modulated, in particular amplitude-modulated, and that the ASE signal is detected in a phase-sensitive manner.

8. The method as in Claim 7, characterized in that the modulation of the pump power (P_p) takes place in such a manner that the time weighted average of the pump power is below a preset limit.

9. The method as in any one of the preceding claims, characterized in that the pump power (P_p) is coupled into the transmission line (9) in a direction opposite that of transmission of the signal that is to be optically amplified.

10. The method as in any one of the preceding claims, characterized in that the pump power-dependent threshold value, the various pump power-dependent threshold values, or the pump power-dependent range of threshold values for the power (P_{ASE}) of the ASE signal are determined in a calibration process, with the value or values for the power (P_{ASE}) of the ASE signal being detected as a function of the pump power (P_p) and preferably stored when the transmission line (9) is connected and intact.

11. An optical amplifier, in particular an optical Raman amplifier,

(a) with a coupling unit (11) for coupling the pump power (P_p) of an optical pump source (13) into an optical transmission line (9),

(b) with a coupling unit (15) for decoupling the ASE (Amplified Spontaneous Emission) signal generated by the pump power (P_p) in the transmission line (9) and fed back toward optical amplifier,

(c) with a detector unit (17) for detecting the decoupled ASE signal, and

(d) with a control unit (19) for controlling the pump source (13) and which takes a signal that has been fed to it by the detector unit (17) and which corresponds to the power (P_{ASE}) of the detected ASE signal and compares it to a preset threshold value and generates an error signal when said signal falls below the threshold value.

12. The optical amplifier as in Claim 11, characterized in that the coupling unit (11) for coupling in the pump power (P_p) is designed in the form of a wavelength-sensitive coupling unit, with wavelengths which are higher by a preset value than the pump wavelength with a low loss being substantially assigned to the optical path for a wanted signal to be transmitted along the transmission line (9) and with lower wavelengths with a low loss being assigned to the branching-off arm for coupling in the pump power (P_p).

13. The optical amplifier as in Claim 11 or 12, characterized in that the coupling unit (15) for decoupling the ASE signal is substantially designed in the form of a wavelength-independent splitter which only decouples a small portion of the power of the ASE signal.

14. The optical amplifier as in any one of Claims 11-13, characterized in that the control unit (19) carries out the process steps according to any one of Claims 2-10.